



MARYLAND  
TRANSPORTATION  
INSTITUTE

# Introduction to Maryland Transportation Institute and CAV-Related Initiatives at UMD

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# UMD CATT CAV Research Areas

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## Pedestrian/Bike/Other Detection

Intersection Object Detection

Intersection Object Tracking

Work Zone Identification

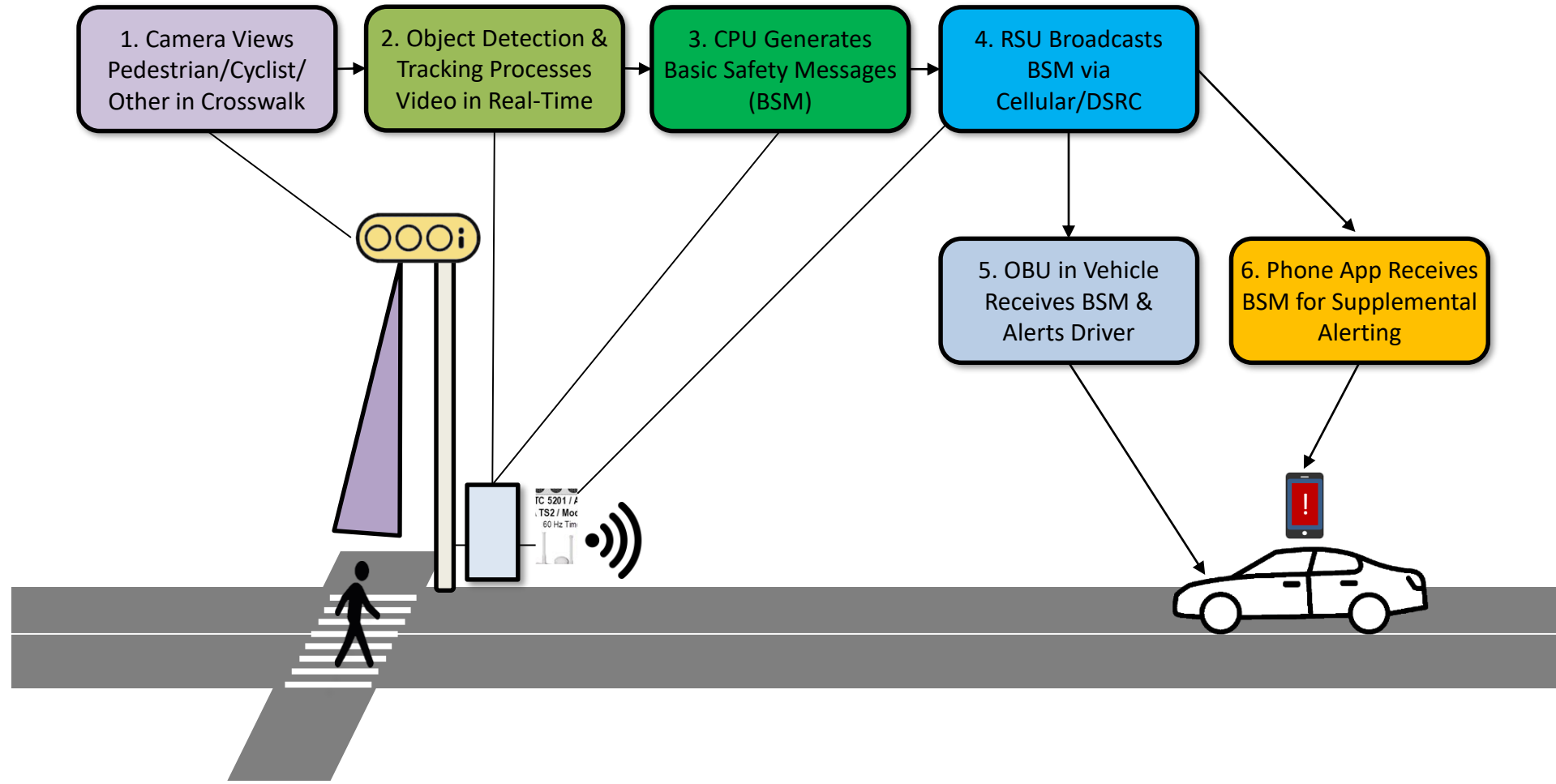
Dilemma Zone Identification

DSRC/Cellular Safety Message  
(BSM/PSM) Transmission

## Vehicle Operation Guidance

- DSRC/Cellular Safety Message (BSM/PSM) Receipt
- Work zone messaging (Speed, Merging, etc.)
- Variable speed limits

# Object Detection & Tracking and BSM Alert Generation & Receipt



# Object Detection & Tracking System Test: College Park Metro Station



# Lab Equipment & Setup

**RSU (infrastructure side) and OBUs (vehicle side)**  
Camera, Comms, PC, etc., & Cobalt Controller



**Kapsch sniffer (Danlaw OBU + eTrans Insight app)**  
Used to independently verify the type, content, and quality of messages that are being broadcast







# Route 1 & Knox Road



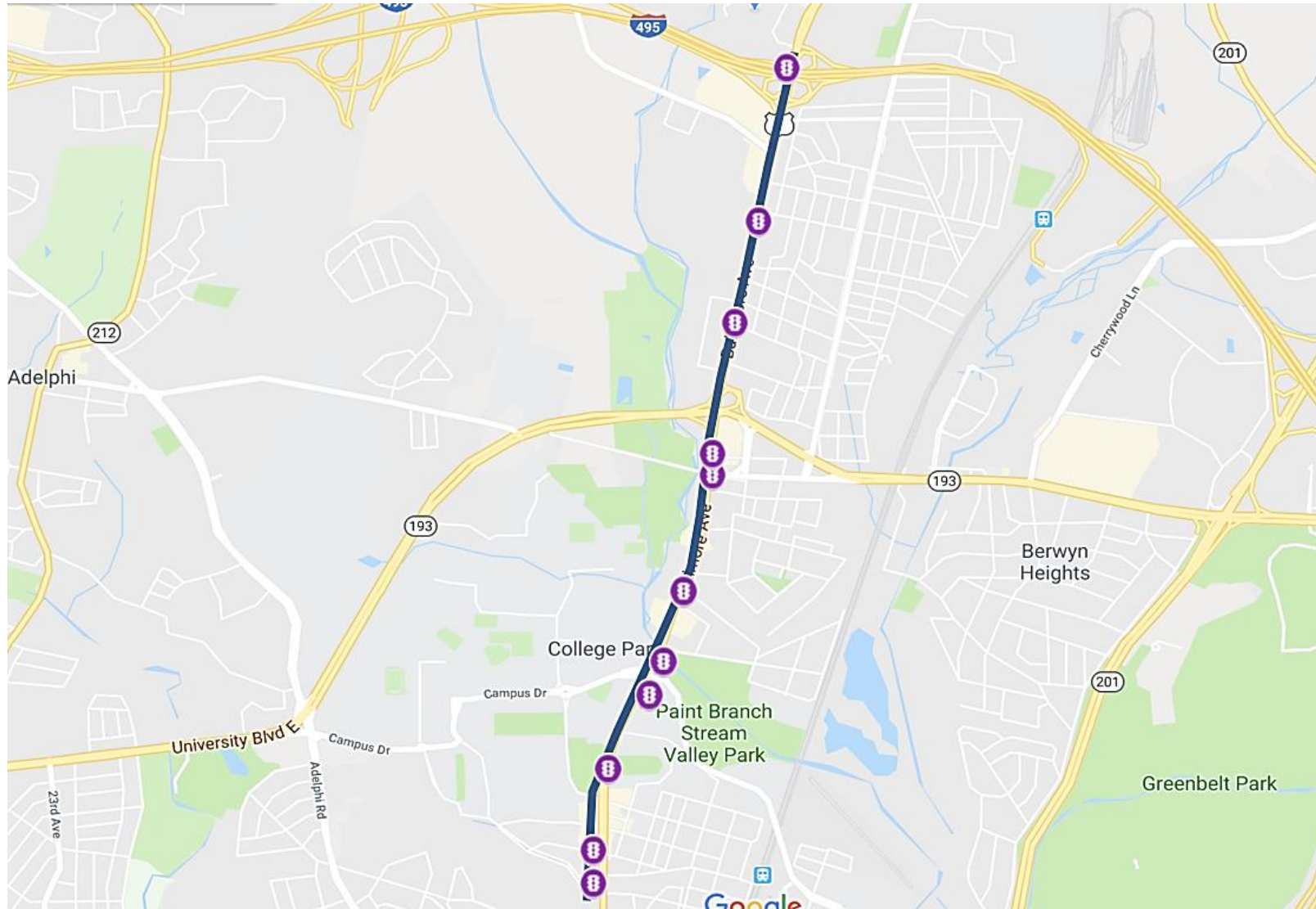
# Current Work



- Continue prototyping of object/pedestrian detection algorithms
- Continue development of BSM/PSM broadcast and receipt messaging,
  - Leveraging DSRC & Cellular technologies
- Prototype in-vehicle and on-infrastructure alerting solutions
  - Including phone app development
- Test integration with third-party commercial technologies
- Coordinate prototyping and testing with state and local jurisdictions on and around UMD College Park campus
  - Includes access to control signal cabinet (Cobalt preferred) & Iteris camera mount

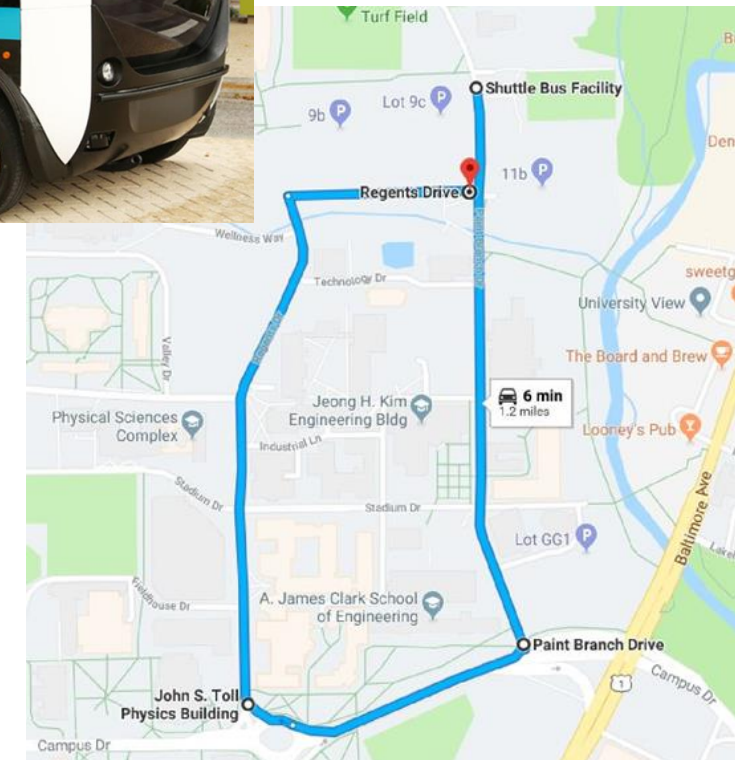


# Possible Smart Cities Route 1 Demo Corridor



# Other related CAV Pilot - Olli

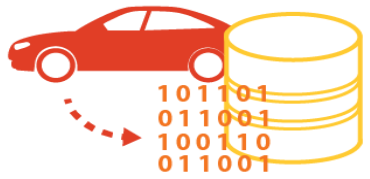
- Level 4 Automated Transit Vehicle
- Local Motors (MD Company in National Harbor)
- 3 month pilot funded by Clark School & MTI
- Currently negotiating agreement



# Maryland Transportation Institute



## A Multidisciplinary Hub for Transportation Research, Innovation, Education, and Technology Transfer



**Transportation  
Big Data and  
Data Analytics**



**Infrastructure  
and Policy  
Innovation**



**Smart Mobility  
for Economic  
Development**



**Technology for  
Safety, Security  
and Health**



**Next Generation  
Freight and Supply  
Chain Logistics**



**Multimodal and  
Emerging  
Mobility Systems**

**MTI Mission:** Through partnerships with our government, non-profit, and private-sector collaborators, the Maryland Transportation Institute (MTI) helps pioneer cost-effective ways to improve safety, reduce congestion, promote sustainability, enhance equity, and preserve infrastructure. With our team of leading international experts in engineering, planning, data analytics, computer and information sciences, social sciences, business and logistics, public policy, public health, and the humanities, MTI is uniquely equipped to foster new approaches that fuel community and economic development in Maryland and beyond.



# MTI Statistics



- Ranked **4th** in the U.S. and **11th** in the world.
- Ranked **2nd** in the world for top journal publications.
- **119 affiliated faculty** from 11 UMD colleges.
- **20 affiliated centers and labs.**
- Research projects totaling more than **\$23 million** a year.
- Home to the **largest transportation data center** in the United States – with more than 10 billion data records collected, fused and analyzed every day. (CATT Lab)
- **120 student researchers** supported annually.
- **600 transportation professionals** trained annually.

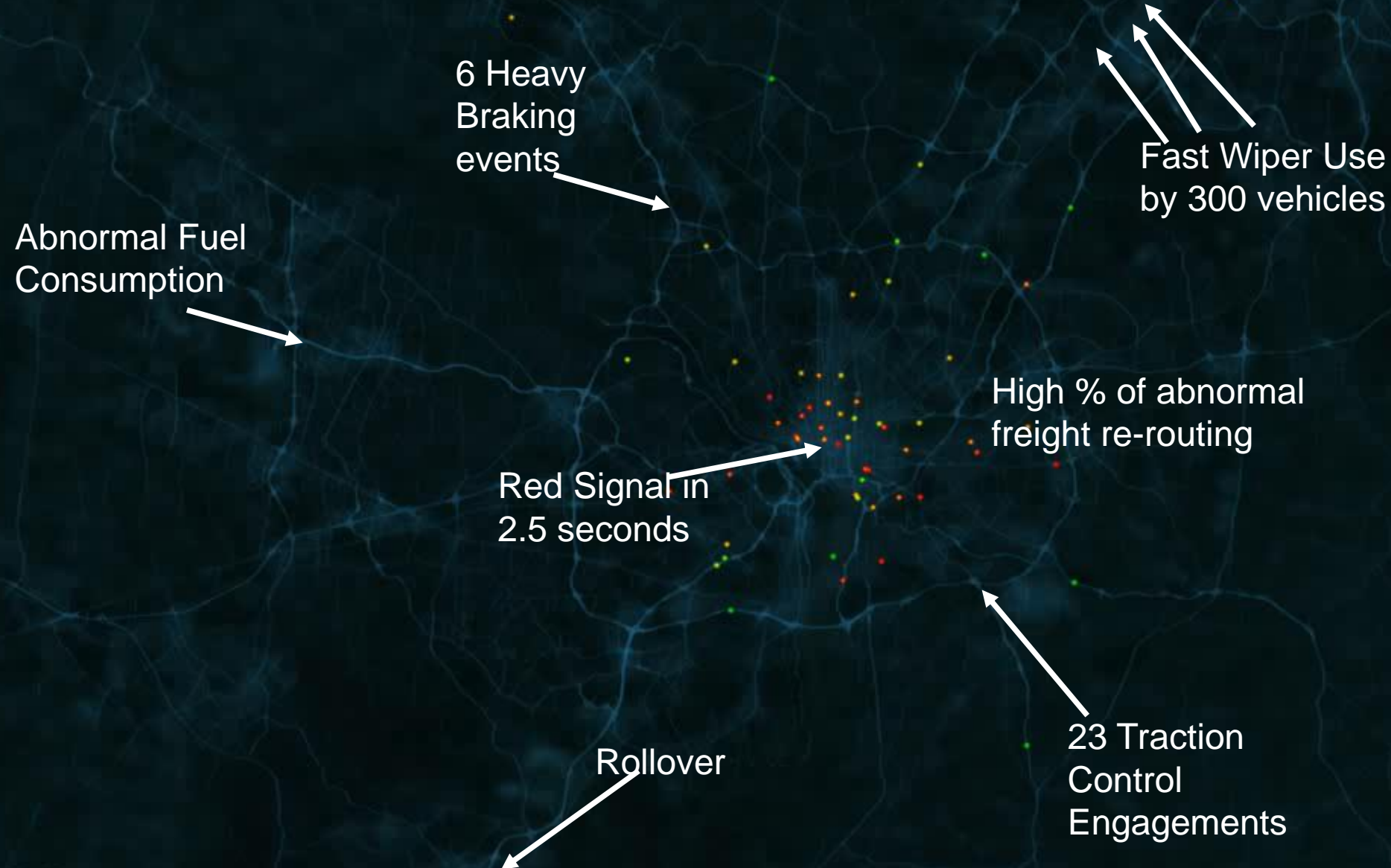
# MTI-Affiliated Research Centers and Labs



- **National University Transportation Center** (Director: Lei Zhang, ENG)
- **Center for Advanced Transportation Technology** (Tom Jacobs, ENG)
- **Center for Advanced Transportation Technology Laboratory** (Michael Pack, ENG)
- **Traffic Safety and Operations Lab** (Gang-Len Chang, ENG)
- Project Management Center of Excellence (Qingbin Cui, ENG)
- Bridge Engineering Software & Technology Center (C.C. Fu, ENG)
- **Automated Vehicle Working Group** (Jeffrey Herrmann, ENG)
- **UAS Test Site** (Matt Scassero, ENG)
- FAA Center of Excellence for Aviation Operations Research (Michael Ball, BUS)
- **National Center for Smart Growth** (Gerrit Knapp, ARCH)
- Center for Geospatial Information Science (Kathleen Stewart, BSOS)
- School of Public Health Research Centers (Dushanka Kleinman, SPH)
- **Behavior Economics Lab** (Erkut Ozbay, BSOS)
- **I-95 Corridor Coalition** (Trish Hendren, ENG)
- **Center for Supply Chain Management** (Tom Corsi, BUS)
- Center for Advanced Study of Communities & Information (Susan Winter, iSchool)
- **Urban Computing Lab** (Vanessa Frias-Martinez, iSchool)
- Center for Global Sustainability (Nathan Hultman, SPP)
- Center for Health and Risk Communication (Xiaoli Nan, ARHU)
- **Human Computer Interaction Lab** (Catherine Plaisant, CMNS)



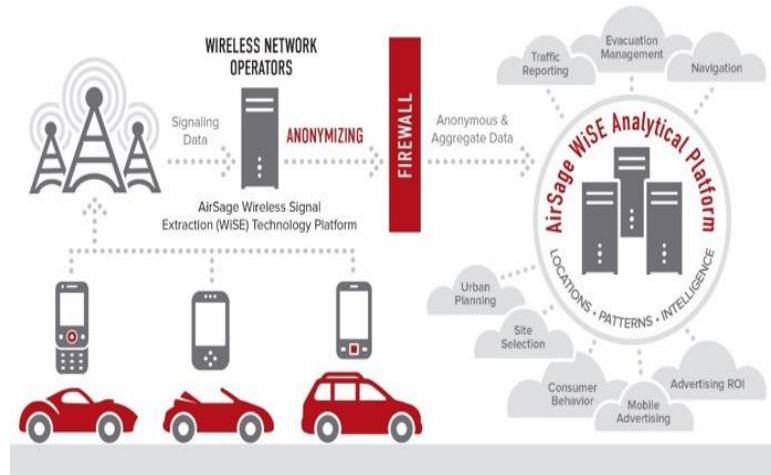
# V2X Data from Connected Vehicle Sensors



05:00 am A day in the life of Washington, D.C.



# Travel Behavior Data for C/AV Research

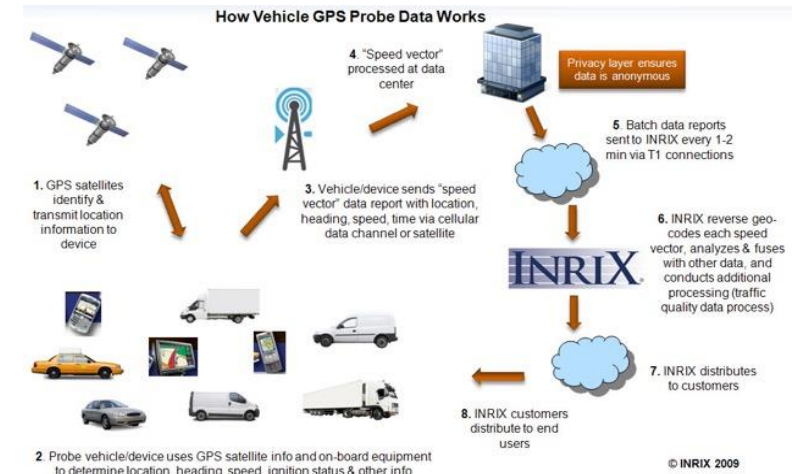


**Cell Phones**



**Smartphone Apps**

Travel  
Surveys and  
Emerging  
Passively  
Collected  
Location  
Data

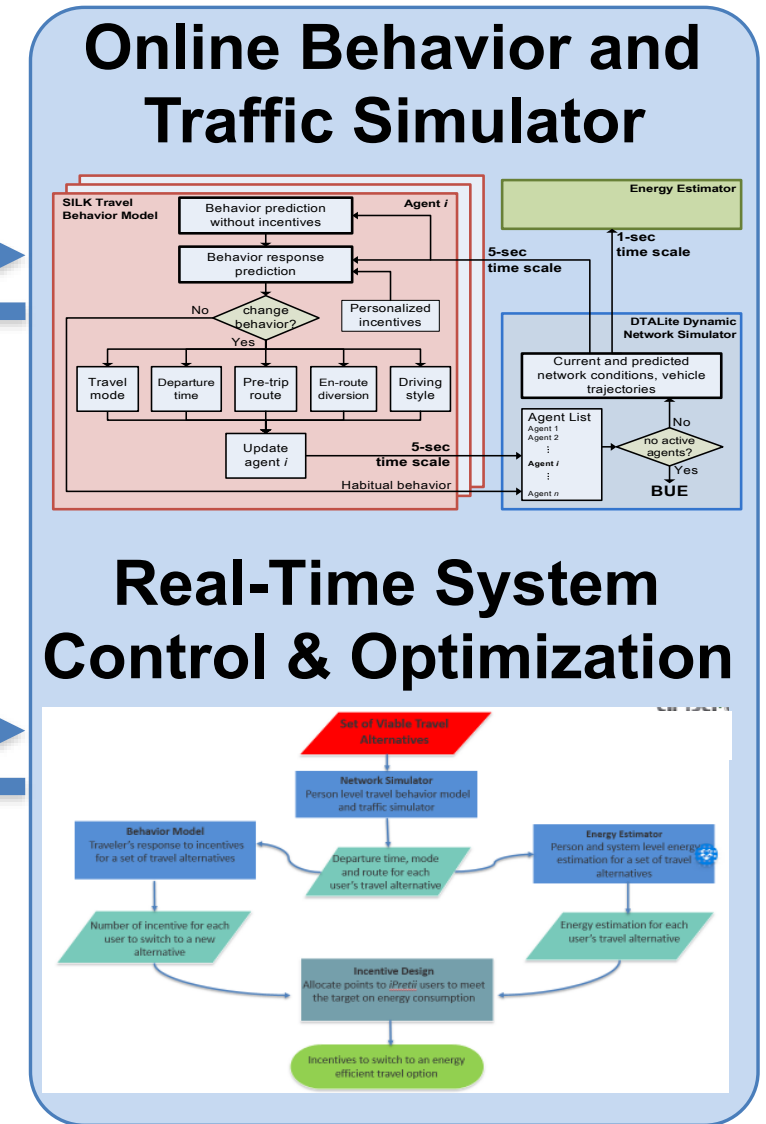
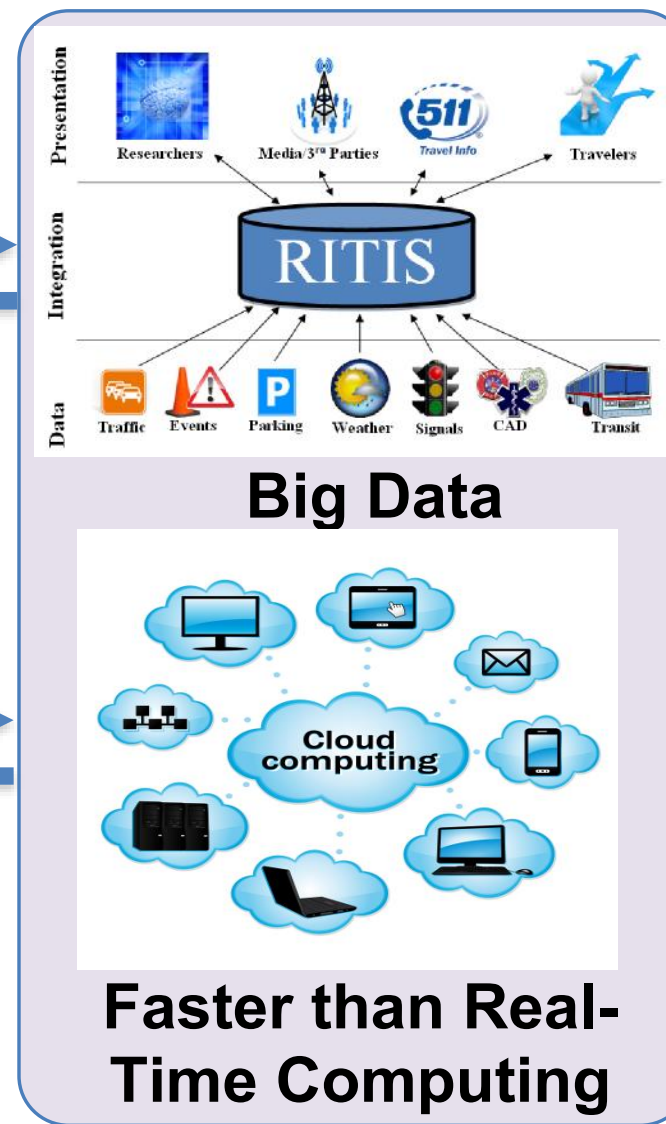
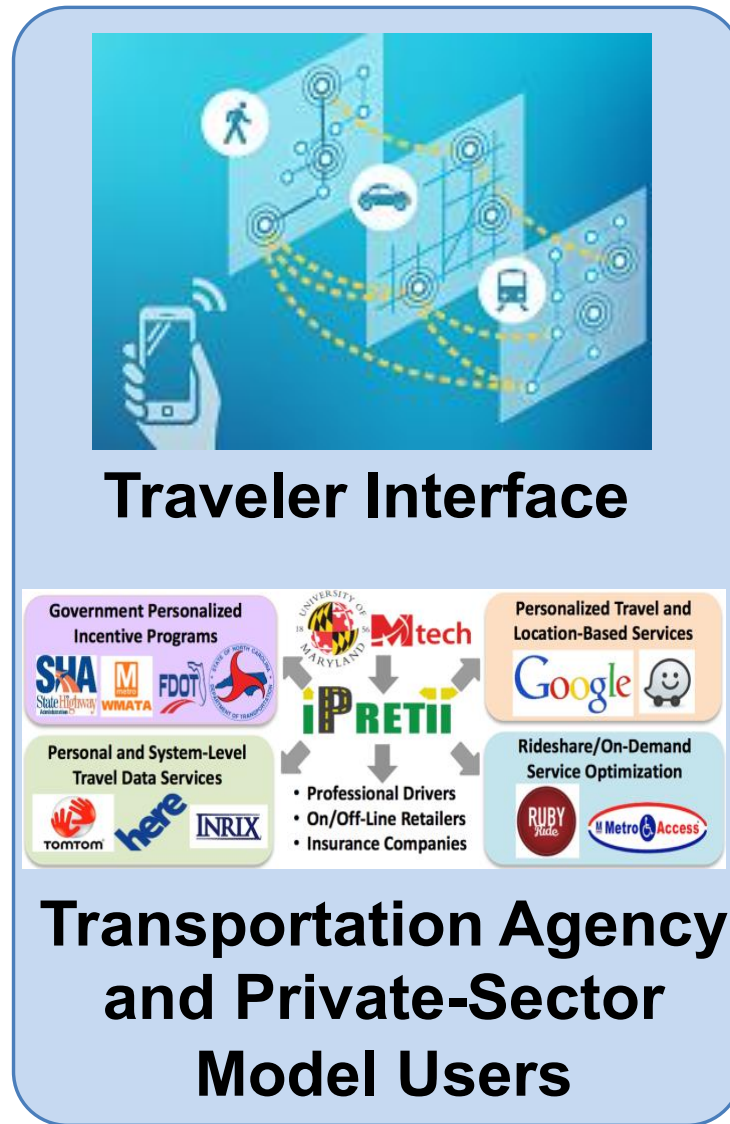


**GPS**



**Social Media**

# Demand and Traffic Simulation for C/AV Studies



# MTI Outreach, Workforce Development, and T2



## ■ Outreach and Tech. Transfer

- ▶ MTI (Maryland Transportation Innovation) Annual Conference
- ▶ MTI Report Series
- ▶ Quick-Response Study
- ▶ MTI Advisory Board
- ▶ Agency and Industry Liaison for MTI Program Areas
- ▶ Annual report, Newsletter, Social Media, and Press Releases

## ■ Education & Workforce Development

- ▶ 110 undergraduate students in transportation and project management track. K-12 education.
- ▶ Master of Science, Engineering, Public Policy, and Professional Studies Programs; Ph.D. Program.
- ▶ Consortium for Innovative Transportation Education Certificate Programs
- ▶ New training programs under development: TSM&O, Data Analysis and Applications, Project Management.
- ▶ Internship, scholarship, fellowship programs in collaboration with public, corporate and non-profit partners.



# MTI Partnership Models



## MTI Has Several Partnership Models for Collaboration:

- **MTI matching funds for C/AV-related research and deployment**
- **MTI is in the process of building a C/AV Program at UMD and would like to partner with MD agencies and companies on C/AV R&D**
- **Memorandum of Understanding setting up collaboration framework**
- **Individual research projects or gifts supporting MTI faculty and students**
- **Master contract with and task orders from partner organizations**
- **Liaison to MTI who helps manage jointly-funded projects and programs**
- **Membership on MTI advisory committee that identifies research topics and transportation solutions of mutual interest**
- **Joint training programs and other workforce development programs**
- **University-wide IP agreement and waivers**
- **Quick-response studies, white papers, and reports**

# Thank you!



MTI.UMD.EDU

# Contact us:



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